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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,912	10/22/2003	Akira Izumi	P/1250-264	6373

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EXAMINER

CHEN, KIN CHAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 08/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/690,912	IZUMI ET AL.	
	Examiner	Art Unit	
	Kin-Chan Chen	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-14,21-24,27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-14,21-24,27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 3, 2006 has been entered.

Claim Rejections - 35 USC § 112

2. Claim 28 recites the limitation "droplets of said alkaline solution are injected" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-10, 21, 22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuda et al. (US 2002/0035762; hereinafter "Okuda") in view of Aoki et al. (US 5,635,053; hereinafter "Aoki") as evidenced by Verhaverbeke (US 5,972,123), Tomita et al. (US 6,431,185; hereinafter "Tomita") and Skee (US 6,465,403).

In a method and system for substrate processing, Okuda teaches that the droplets formed by mixing an alkaline solution (or acid solution) and gas may be injected from a nozzle to a surface of a substrate. (abstract; [0028], [0295]).

Unlike the claimed invention, Okuda does not teach two or three steps of applying various solutions to the surface of a substrate. In a method for cleaning the substrate, Aoki (col.1 lines 36 to 47) teaches a first step of applying a mixed solution containing an ammonia water and hydrogen peroxide water and a second step of applying a mixed solution containing hydrochloric acid and hydrofluoric acid to efficiently clean the surface of a substrate. Aoki also teaches using the cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (col.1, line 42, see also the example starting from col. 1, line 46). Hence, it would have been obvious to one with ordinary skill in the art to apply an alkaline solution, an acid solution, then an alkaline solution as instantly claimed, depending on the product requirement in order to achieve the required cleanness. As such, it would have been obvious to one with ordinary skill in the art to use multiple steps cleaning methods as taught by Aoki in the process of Okuda in order to efficiently clean the surface of a substrate.

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The above-cited claims differ from the prior art by specifying various process parameters (such as ordinary temperature in claim 21; pH value in claim 22) for the alkaline and acid solutions. However, same are known to be result-effective variables and commonly determined by routine experiments. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using ordinary temperature and adjusting concentration of alkaline solution for desired pH value) to obtain optimal result with a reasonable expectation of success. See the case laws cited below. Also see Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45), Tomita et al. (US 6,431,185; col. 22, lines 40-50) and Skee (US 6,465,403; Table 17A-17E) as evidence. Verhaverbeke discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning, which clearly shows that temperature is a recognized result-effective variable in the art of wet cleaning. Tomita and Skee show the pH value is a recognized result-effective variable in the art of wet cleaning.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). In re Woodruff, 16USPQ2d 1934,1936 (Fed. Cir.1990); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809; In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" Ex parte Khusid, 174 USPQ 59.

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5. Claims 11-14, 23, 24, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (US 5,635,053; hereinafter "Aoki") in view of Hall (US 4,326,553) or Bran (US 6,039,059) as evidenced by Verhaverbeke (US 5,972,123), Tomita et al. (US 6,431,185; hereinafter "Tomita") and Skee (US 6,465,403).

Aoki (col.1 lines 36 to 47) teaches a first step of applying a mixed solution containing an ammonia water and hydrogen peroxide water and a second step of applying a mixed solution containing hydrochloric acid and hydrofluoric acid to efficiently clean the surface of a substrate. Aoki teaches using the cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (col. 1, line 42, see also the example starting from col. 1, line 46). Hence, it would have been obvious to one with ordinary skill in the art to apply an alkaline solution, an acid solution, then an alkaline solution as instantly claimed, depending on the product requirement in order to achieve the required cleanness.

The claimed invention differs from the prior art by specifying conventional method of applying megasonic vibrations to the solution. Hall (abstract; col. 2, lines 12-25) or Bran (US 6,039,059; abstract; col. 1, lines 10-15) is only relied on to show the conventional method of applying megasonic vibrations to the solution. Because it is a convention method and because it is disclosed by Hall or Bran, it would have been obvious to one with ordinary skill in the art to apply megasonic vibrations to the solution in the process of Aoki in order to effectively remove the particles.

Claim 28 differs from the prior art by specifying well-known feature (such as using nozzle to inject droplets of the alkaline solution) to the art of semiconductor device

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fabrication, the examiner takes official notice. A person having ordinary skill in the art would have found it obvious to modify the prior art by incorporating the nozzle to inject droplets of the alkaline solution to same in order to improve the efficiency of the cleaning process with a reasonable expectation of success.

The above-cited claims differ from the prior art by specifying various process parameters (such as ordinary temperature in claim 23; pH value in claim 24) for the alkaline and acid solutions. However, same are known to be result-effective variable and commonly determined by routine experiment. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using ordinary temperature and adjusting concentration of alkaline solution for desired pH value) to obtain optimal result with a reasonable expectation of success. See the case laws cited below. Also see *Verhaverbeke* (US 5,972,123; col. 5, lines 25-29; 43-45) *Tomita et al.* (US 6,431,185; col. 22, lines 40-50) and *Skee* (US 6,465,403; Table 17A-17E) as evidence. *Verhaverbeke* discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning, which clearly shows that temperature is a recognized result-effective variable in the art of wet cleaning. *Tomita* and *Skee* show the pH value is a recognized result-effective variable in the art of wet cleaning.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

CRITICALITY OF PROCESSING PARAMETERS

"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" Ex parte Khusid, 174 USPQ 59.

Response to Arguments

6. Applicant's arguments filed August 3, 2006 have been fully considered but they are not persuasive.

Applicant has argued that the prior art does not teach the particle removing effect shown in Fig.29. It is not persuasive. It is noted that the features upon which applicant relies (i.e., The alkaline solution is prepared from a mixed solution containing ammonia water, hydrogen peroxide water and deionized water in volume ratios of 1:1:100, and the acid solution is prepared from a mixed solution of dilute hydrofluoric acid and dilute hydrochloric acid containing hydrofluoric acid, hydrochloric acid and deionized water in volume ratios of 1:40:200) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

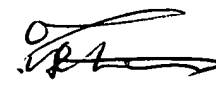
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45)

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discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning. Tomita et al. (US 6,431,185; col. 22, lines 40-50) teaches the theory and principles in pH dependency on the cleaning of the semiconductor substrate. Skee (US 6,465,403; Table 17A-17E) shows the effect of the pH and composition /concentration on the cleaning of the semiconductor substrate.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

August 11, 2006


K. C. Chen
Kin-Chan Chen
Primary Examiner
Art Unit 1765